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BBA APPROVAL INSPECTION TESTING CERTIFICATION
TECHNICAL APPROVALS FOR CONSTRUCTION

Agrément Certificate
12/4918
Product Sheet 8

INSULETICS EXTERNAL WALL INSULATION SYSTEMS

INSUL-MACE E EXTERNAL WALL INSULATION SYSTEM

This Agrément Certificate Product Sheet(1) relates to the Insul-Mace E External Wall Insulation System, comprising mechanically-fixed grey expanded polystyrene (EPS) boards with a mesh-reinforced basecoat and render finish, and suitable for use on new or existing domestic and non-domestic buildings.

(1) Hereinafter referred to as 'Certificate'.

CERTIFICATION INCLUDES:

- factors relating to compliance with Building Regulations where applicable
- factors relating to additional non-regulatory information where applicable
- independently verified technical specification
- assessment criteria and technical investigations
- design considerations
- installation guidance
- regular surveillance of production
- formal three-yearly review.

KEY FACTORS ASSESSED

Thermal performance — the system can be used to improve the thermal performance of external walls and can contribute to satisfying the requirements of the national Building Regulations (see section 6).

Strength and stability — the system can adequately resist wind loads and impact damage (see section 7).

Behaviour in relation to fire — the system has an B-s1, d0 reaction to fire classification in accordance with BS EN 13501-1 : 2007 (see section 8).

Risk of condensation — the system can contribute to limiting the risk of interstitial and surface condensation (see section 11).

Durability — when installed and maintained in accordance with the Certificate holder's recommendations and the terms of this Certificate, the system should remain effective for at least 30-years (see section 13).

The BBA has awarded this Certificate to the company named above for the system described herein. This system has been assessed by the BBA as being fit for its intended use provided it is installed, used and maintained as set out in this Certificate.

On behalf of the British Board of Agrément

Date of First issue: 14 April 2014

John Albon — Head of Approvals
Energy and Ventilation

Claire Curtis-Thomas
Chief Executive

The BBA is a UKAS accredited certification body — Number 113. The schedule of the current scope of accreditation for product certification is available in pdf format via the UKAS link on the BBA website at www.bbacerts.co.uk

Readers are advised to check the validity and latest issue number of this Agrément Certificate by either referring to the BBA website or contacting the BBA direct.

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Regulations

In the opinion of the BBA, the Insul-Mace E External Wall Insulation System, if installed, used and maintained in accordance with this Certificate, can satisfy or contribute to satisfying the relevant requirements of the following Building Regulations (the presence of a UK map indicates that the subject is related to the Building Regulations in the region or regions of the UK depicted):

The Building Regulations 2010 (England and Wales) (as amended)

Requirement:	A1	Loading
Comment:		The system can sustain and transmit wind loads to the substrate wall. See section 7.4 of this Certificate.
Requirement:	B4(1)	External fire spread
Comment:		The system can satisfy or contribute to satisfying this Requirement. See sections 8.1 to 8.4 of this Certificate.
Requirement:	C2(b)	Resistance to moisture
Comment:		The system provides a degree of protection against rain ingress. See sections 4.4 and 10.1 of this Certificate.
Requirement:	C2(c)	Resistance to moisture
Comment:		The system can contribute to minimising the risk of interstitial and surface condensation. See sections 11.1, 11.2 and 11.4 of this Certificate.
Requirement:	L1(a)(i)	Conservation of fuel and power
Comment:		The system can contribute to satisfying this Requirement. See sections 6.2 and 6.3 of this Certificate.
Regulation:	7	Materials and workmanship
Comment:		The system is acceptable. See section 13.1 and the *Installation* part of this Certificate.
Regulation:	26	CO_2 emission rates for new buildings
Regulation:	26A	Fabric energy efficiency rates for new dwellings (England only)
Comment:		The system will enable, or contribute to enabling, a wall to satisfy the U value requirement. See sections 6.2 and 6.3 of this Certificate.

The Building (Scotland) Regulations 2004 (as amended)

Regulation:	8(1)(2)	Durability, workmanship and fitness of materials
Comment:		The system can contribute to a construction satisfying this Regulation. See sections 12.1 and 13.1 and the *Installation* part of this Certificate.
Regulation:	9	Building standards applicable to construction
Standard:	1.1	Structure
Comment:		The system can sustain and transmit wind loads to the substrate wall. See section 7.4 of this Certificate.
Standard:	2.6	Spread to neighbouring buildings
Comment:		The system is regarded as 'low risk' and, therefore, can satisfy this Standard, with reference to clauses 2.6.4(1)(2), 2.6.5(1) and 2.6.6(2). See sections 8.1 to 8.6 of this Certificate.
Standard:	2.7	Spread on external walls
Comment:		The system can satisfy the requirements of this Standard, with reference to clauses 2.7.1(1)(2) and 2.7.2(2). See sections 8.1 to 8.6 of this Certificate.
Standard:	3.10	Precipitation
Comment:		The system will contribute to a construction satisfying this Standard, with reference to clauses 3.10.1(1)(2) and 3.10.2(1)(2). See sections 4.4 and 10.1 of this Certificate.
Standard:	3.15	Condensation
Comment:		The system will satisfy the requirements of this Standard, with reference to clauses 3.15.1(1)(2), 3.15.4(1)(2) and 3.15.5(1)(2). See sections 11.3 and 11.4 of this Certificate.
Standard:	6.1(b)	Carbon dioxide emissions
Standard:	6.2	Buildings insulation envelope
Comment:		The system can contribute to satisfy these Standards, with reference to clauses (or parts of) 6.1.1(1), 6.1.2(1)(2), 6.1.3(1)(2), 6.1.6(1), 6.1.10(2), 6.2.1(1)(2), 6.2.3(1), 6.2.4(2), 6.2.5(2), 6.2.6(1), 6.2.7(1), 6.2.8(2), 6.2.9(1)(2), 6.2.10(1), 6.2.11(1), 6.2.12(2) and 6.2.13(1)(2). See sections 6.2 and 6.3 of this Certificate.
Standard:	7.1(a)(b)	Statement of sustainability
Comment:		The system can contribute to satisfying the relevant requirements of Regulation 9, Standards 1 to 6, and therefore will contribute to a construction meeting the bronze level of sustainability as defined in this Standard. In addition, the system can contribute to a construction meeting a higher level of sustainability as defined in this Standard with reference to clauses 7.1.4(1)(2) [Aspect 1(1)(2) and 2(1)], 7.1.6(1)(2) [Aspect 1(1)(2) and 2(1)] and 7.1.7(1)(2) [Aspect 1(1)(2)]. See sections 6.2 and 6.3 of this Certificate.
Regulation:	12	Building standards applicable to conversions
Comment		All comments given for the system under Regulation 9, Standards 1 to 6, also apply to this Regulation, with reference to clause 0.12.1(1)(2) and Schedule 6(1)(2).

(1) Technical Handbook (Domestic).

(2) Technical Handbook (Non-Domestic).

The Building Regulations (Northern Ireland) 2012

Regulation:	23	Fitness of materials and workmanship
Comment:		The system is acceptable. See section 13.1 and the *Installation* part of this Certificate.

Regulation:	28(b)	Resistance to moisture and weather
Comment:		The system provides a degree of protection against rain ingress. See sections 4.4 and 10.1 of this Certificate.
Regulation:	29	Condensation
Comment:		The system can contribute to minimising the risk of interstitial and surface condensation. See sections 11.2 and 11.4 of this Certificate.
Regulation:	30	Stability
Comment:		The system can sustain and transmit wind loads to the substrate wall. See section 7.4 of this Certificate.
Regulation:	36(a)	External fire spread
Comment:		The system can satisfy or contribute to satisfying this requirement. See sections 8.1 to 8.4 of this Certificate.
Regulation:	39(a)(i)	Conservation measures
Regulation:	40	Target carbon dioxide emission rate
Comment:		The system can contribute to satisfying these Regulations. See sections 6.2 and 6.3 of this Certificate.

Construction (Design and Management) Regulations 2007

Construction (Design and Management) Regulations (Northern Ireland) 2007

Information in this Certificate may assist the client, CDM co-ordinator, designer and contractors to address their obligations under these Regulations.

See section: 3 *Delivery and site handling* (3.2 and 3.4) of this Certificate.

Additional Information

NHBC Standards 2014

NHBC accepts the use of the Insul-Mace E External Wall Insulation System, provided it is installed, used and maintained in accordance with this Certificate, in relation to *NHBC Standards*, Part 6 *Superstructure (excluding roofs)*, Chapter 6.9 *Curtain walling and cladding*.

Technical Specification

1 Description

1.1 The Insul-Mace E External Wall Insulation System consists of grey EPS insulation boards which are mechanically fixed to the substrate wall, high polymer content basecoat, reinforcing mesh and a polymer-modified render finish that is applied in two coats and cut to give the appearance of brickwork.

1.2 The system (see Figure 1) comprises:

Insulation

- Insul-Pol EN EPS 70E (enhanced expanded polystyrene) insulation board — 1200 mm by 600 mm in a range of thicknesses between 40 mm and 200 mm in 10 mm increments, with a nominal density of 17 kg·m^{-3}, a minimum compressive strength of 70 kN·m^{-2} and a nominal tensile strength perpendicular to the face of 140 kPa. Boards are manufactured to comply with the requirements of EPS 70, Class E (flame retardant) material to BS EN 13163 : 2008.

Mechanical fixings

- mechanical fixings(1) — proprietary external wall insulation fixings of adequate length to suit the substrate and insulation thickness, selected from:
  - — Ejotherm NT U — polyethylene, PE-HD with stainless steel or electro-galvanized pins
  - — Ejotherm STR U — polyethylene, PE-HD with stainless steel or electro-galvanized screws.

Ejot SBL 140, a 140 mm diameter polyamide extension washer, can be used in conjunction with the above anchors to enhance the pull-through capacity.

(1) Other fixings may be used provided they can be demonstrated to have equal or higher pull-out, plate diameter and plate stiffness characteristics.

Basecoat

- Insul-Poly 14 Basecoat — a cement-based, high polymer-modified basecoat. It is supplied as a powder, to which only potable water is added in the correct proportion, and applied to an overall thickness of 6 mm or greater.

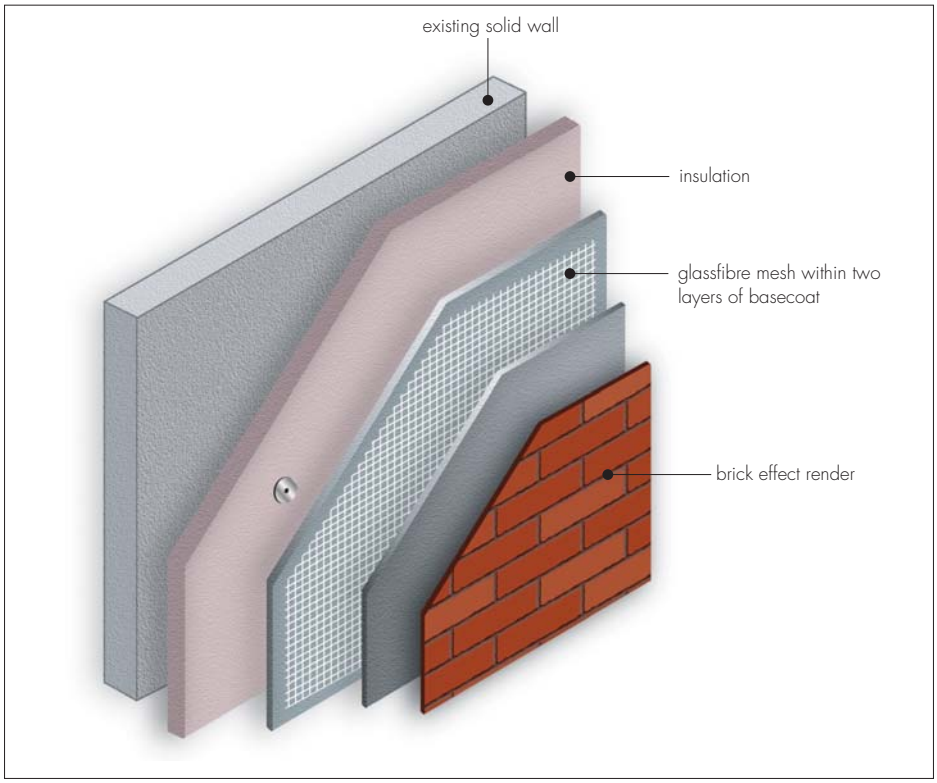
Reinforcement

- reinforcing mesh — an alkali-resistant glassfibre mesh in 50 m by 1 m rolls, with a 3.5 mm by 3.5 mm mesh size, organic content of 20%, PCS value of 8.17 MJ·kg^{-1} and a nominal weight of 160 g·m^{-2}.

Finish

- Insuletics Insul-Mace Render — a polymer-modified cement binder, two-coat, self-coloured render system.

Figure 1 Insuletics External Wall Insulation System



1.3 Ancillary materials also used with the system but outside the scope of this Certificate:

- profiles — a range of standard profiles for such details as wall bases, end stops, corner meshes, render stops and expansion joints, produced in aluminium, galvanized steel with a polyester powder paint or stainless steel
- profile connectors and fixings
- silicone-based joint sealant
- PU foam.

1.4 The insulation boards are primarily secured with mechanical fixings to the substrate. Basecoat render is trowel-applied to the board face to a thickness of 3 mm, including a layer of embedded mesh reinforcement, before applying a second 3 mm layer of basecoat. When dry, the first mortar coat is applied to a thickness of 6 mm to 8 mm. After this has 'firmed-up', the second (brick face) coat is applied to a thickness of 3 mm to 5 mm then cut to the desired brick pattern.

2 Manufacture

As part of the assessment and ongoing surveillance of the quality of the system components, the BBA has:

- agreed with the manufacturer the quality control procedures and product testing to be undertaken
- assessed and agreed the quality control operated over batches of incoming materials
- monitored the production process and verified that it is in accordance with the documented process
- evaluated the process for management of nonconformities
- checked that equipment has been properly tested and calibrated
- undertaken to carry out the above measures on a regular basis through a surveillance process, to verify that the specifications and quality control operated by the manufacturer are being maintained.

3 Delivery and site handling

3.1 The insulation is delivered to site shrink-wrapped in polythene packs bearing the manufacturer's and product identification marks and batch numbers.

3.2 Components are delivered in the quantities and packages listed in Table 1. Each package carries the manufacturer's and product identification and batch number. The basecoat and render also include the BBA logo incorporating the number of this Certificate.

Table 1 Component supply details

Component	Quantity and packaging
Insul-Pol EN EPS 70E Insulation	shrink-wrapped
Insuletics Insul-Poly14 Basecoat	25 kg bag
Reinforcing mesh	1 m x 50 m roll
Insuletics Insul-Mace Render	25 kg bag
Fixings	boxed by the manufacturer

3.3 The insulation boards must be stored on a firm, clean, level base, off the ground and protected from prolonged exposure to sunlight, either by storing opened packs under cover in dry conditions or re-covering with opaque polythene sheeting.

3.4 Care must be taken when handling the insulation boards to avoid both damage and contact with solvents or bitumen products. The boards must not be exposed to open flame or other ignition sources. Boards that become damaged, soiled or wet should be discarded.

3.5 The basecoat and render components should be stored in dry conditions, off the ground and protected from frost at all times. Bags of unopened render will have a shelf-life of 12 months when stored correctly.

Assessment and Technical Investigations

The following is a summary of the assessment and technical investigations carried out on the Insul-Mace E External Wall Insulation System.

Design Considerations

4 General

4.1 The Insul-Mace E External Wall Insulation System, when installed in accordance with this Certificate, is effective in reducing the thermal transmittance (U value) of the external masonry walls of new and existing buildings. It is essential that the detailing techniques specified in this Certificate are carried out to a high standard if the ingress of water into the insulation is to be avoided and the full thermal benefit obtained from the system. Only details specified by the Certificate holder should be used.

4.2 The system will improve the weather resistance of a wall and provide a decorative finish. However, it may be installed only where there are no signs of dampness on the inner surface of the wall, other than those caused solely by condensation.

4.3 The system is applied to the outside of external walls of masonry and dense or no-fines concrete construction and is suitable for use on new or existing domestic or non-domestic buildings (with or without an existing render) up to 18 metres in height. Prior to installation of the system, the wall surfaces should comply with section 14 of this Certificate.

4.4 New buildings subject to national Building Regulations should be constructed in accordance with the relevant recommendations of:

- BS EN 1996-2 : 2006 and its UK National Annex — the designer should select a construction appropriate to the local wind-driven rain index, paying due regard to the design detailing, workmanship and materials to be used
- BS 8000-3 : 2001.

4.5 New buildings not subject to any of the previous requirements should also be built in accordance with BS EN 1996-2 : 2006 and its UK National Annex.

4.6 The effect of the installation of the system on the acoustic performance of a construction is outside the scope of this Certificate.

4.7 The fixing of rainwater goods, satellite dishes, clothes lines, hanging baskets and similar items is outside the scope of this Certificate.

4.8 External plumbing should be removed before installation and alterations made to underground drainage, where appropriate, to accommodate repositioning of the plumbing on the finished face of the system.

4.9 It is essential that the system is installed and maintained in accordance with the conditions set out in this Certificate.

5 Practicability of installation

The system should only be installed by specialised contractors who have successfully undergone training and registration by the Certificate holder.

Note: The BBA operates a UKAS Accredited Approved Installer Scheme for external wall insulation; details of approved installer companies are included on the BBA's website (www.bbacerts.co.uk).

6 Thermal performance

6.1 Calculations of the thermal transmittance (U value) should be carried out in accordance with BS EN ISO 6946 : 2007 and BRE Report BR 443 : 2006, using a declared thermal conductivity (λ_D *value*) of 0.032 $W \cdot m^{-1} \cdot K^{-1}$.

6.2 The U value of a completed wall will depend on the thickness of the insulation used, the number and type of fixings, the insulating value of the substrate masonry and its internal finish. Example U values of walls incorporating the system are given in Table 2.

Table 2 Insulation thickness required to achieve U value[1][2][3]

U value ($W \cdot m^{-2} \cdot K^{-1}$)	Thickness of insulation[4] (mm)	
	215 mm Brickwork, λ = 0.56 $W \cdot m^{-1} \cdot K^{-1}$	200 mm Dense blockwork, λ = 1.75 $W \cdot m^{-1} \cdot K^{-1}$
0.19	160	170
0.25	110	120
0.26	110	120
0.28	100	110
0.30	90	100
0.35	80	85

(1) Wall construction inclusive of 13 mm plaster (λ = 0.57 $W \cdot m^{-1} \cdot K^{-1}$), 5 mm render ($\lambda$ = 1.0 $W \cdot m^{-1} \cdot K^{-1}$). Brickwork (protected) with 17.1% mortar or dense blockwork with 6.7% mortar (λ = 0.88 $W \cdot m^{-1} \cdot K^{-1}$). Insulation λ_D as 6.1.

(2) Calculation based on a system that included 7 fixings per m^2 with a point thermal transmittance χ_p=0.002 $W \cdot K^{-1}$. Use of other types of fixings should be calculated in accordance with BS EN ISO 6946 : 2007.

(3) Based on calculations in accordance with BS EN ISO 6946 : 2007.

(4) Based upon incremental insulation thickness of 10 mm.

6.3 The system can maintain, or contribute to maintaining, continuity of thermal insulation at junctions between external walls and junctions. Details shown in section 16 will allow use of the default ψ-values (Psi) for Accredited Construction Details in Emission Rate calculations to SAP 2009 or the Simplified Building Energy Model (SBEM). Guidance on limiting heat loss at junctions can be found in:

England and Wales — Approved Documents to Part L and, for new thermal elements to existing buildings, Accredited Construction Details (version 1.0). For new-build, see also SAP 2009, Appendix K, and the *iSBEM User Manual*

Scotland — Accredited Construction Details (Scotland)

Northern Ireland — Accredited Construction Details (version 1.0).

7 Strength and stability

7.1 When installed on suitable walls, the system can adequately transfer to the wall the self-weight and negative (suction) and positive (pressure) wind loads normally experienced in the United Kingdom.

7.2 Positive wind load is transferred to the substrate wall directly via bearing and compression of the render, and insulation.

7.3 Negative wind pressure is resisted by the bond between each component. The insulation boards are retained by the external wall insulation system anchors.

7.4 The wind loads on the wall should be calculated in accordance with BS EN 1991-1-4 : 2005. Special consideration should be given to locations with high wind-load pressure coefficients as additional fixings may be necessary. In accordance with BS EN 1990 : 2002, it is recommended that a load factor of 1.5 is used to determine the ultimate wind load to be resisted by the system.

7.5 Assessment of structural performance for individual buildings must be carried out by a suitably qualified and experienced person to confirm that:

- the substrate wall has adequate strength to resist additional loads that may be applied as a result of installing the system, ignoring any contribution that may occur from the insulation system.
- the proposed system and associated fixing layout provides adequate resistance to negative wind loads based on the results of the site investigation and test results.
- an appropriate number of site-specific pull-out tests are conducted on the substrate of the building to determine the minimum resistance to failure of the fixings. The characteristic pull-out resistance should be determined in accordance with the guidance given in ETAG 014 : 2002, Annex D.

7.6 The number and centres of fixings should be determined by the system designer. Provided the substrate wall is suitable and an appropriate fixing is selected, the mechanical fixings will adequately support and transfer the weight of the render insulation system to the substrate wall.

7.7 Typical characteristic pull-out strengths for the fixings taken from the corresponding European Technical Approval (ETA) are given in Table 3 of this Certificate; however, these values are dependent on the substrate and the fixing must be selected to suit the loads and substrate concerned.

Table 3 Fixings — typical characteristic pull-out strengths

Fixing type	ETA Number	Substrate	Drill diameter (mm)	Effective anchorage depth (mm)	Typical pull-out strength[1] (kN)
Ejotherm NT U	05/0009	Concrete C12/15/ Clay bricks	8	25	1.2/1.5
Ejotherm STR U	04/0023	Concrete C12/15/ Clay bricks	8	25	1.5/1.5

(1) Values are determined in accordance with ETAG 014 : 2002 and are dependent on the substrate.

7.8 The pull-through resistance determined by the BBA from tests on anchors are given in Table 4.

Table 4 Insulation pull-through resistances

Factor (unit)	Insulation value	
Insulation thickness (mm)	60	60
Plate diameter of anchor (mm)	60	60[1]
Characteristic pull-through resistance[2] (per anchor) (N)	475	1090
Factor of safety[3]	2.5	2.5
Design pull-through resistance(N)	190.5	436

(1) This fixing is used with a 140 mm diameter anchor extension washer — SBL 140 Plus.
(2) Characteristic value in accordance with BS EN 1990 : 2002, Annex D7.2.
(3) The safety factor of 2.5 is applied and based on the assumption that all insulation boards are quality controlled tested to establish tensile strength perpendicular to the face of the board.

Impact loading

7.8 Hard body impact tests were carried out in accordance with ETAG 004 : 2011. The system is suitable for all Use Categories[1].

(1) The Use Categories are defined in ETAG 004 : 2011 as:
- Category I — a zone readily accessible at ground level to the public and vulnerable to hard body impacts but not subjected to abnormally rough use
- Category II — a zone liable to impacts from thrown or kicked objects, but in public locations where the height of the system will limit the size of the impact; or at lower levels where access to the building is primarily to those with some incentive to exercise care
- Category III — a zone not likely to be damaged by normal impacts caused by people or by thrown or kicked objects.

8 Behaviour in relation to fire

8.1 The reaction to fire classification for the rendering system, in accordance with BS EN 13501-1 : 2007, is B-s1, d0.

8.2 The classification applies to the full range of thicknesses and finishes covered by this Certificate.

8.3 The system is restricted for use in buildings up to 18 metres in height.

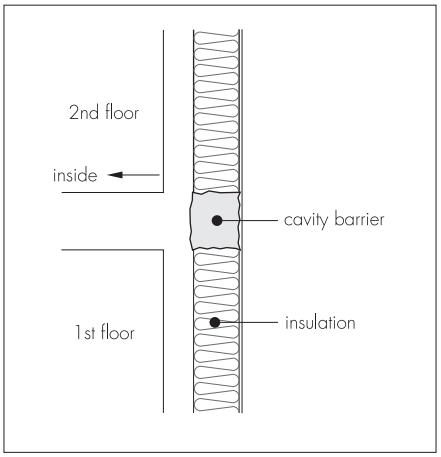
8.4 For houses in Scotland and for all buildings in England and Wales and Northern Ireland, the system is suitable for use on, or at any distance from, the boundary.

8.5 For flats and maisonettes and non-domestic buildings in Scotland, the system is suitable only for use more than one metre from the boundary.

8.6 The system is not classified as 'non-combustible', therefore calculations for unprotected areas may apply, dependent on the fire resistance characteristics of the wall.

8.7 For application to second storey walls and above, it is recommended that the designer considers at least one stainless steel fixing per square metre and fire barriers in line with compartment walls and floors as advised in BRE Report BR 135: 2013 (see Figure 2).

Figure 2 Fire barrier



9 Proximity of flues and appliances

When the system is installed in close proximity to certain flue pipes, the relevant provisions of the national Building Regulations should be met:

England and Wales — Approved Document J

Scotland — Mandatory Standard 3.19, clause 3.19.4[1][2]

(1) Technical Handbook (Domestic).

(2) Technical Handbook (Non-Domestic).

Northern Ireland — Technical Booklet L.

10 Water resistance

10.1 The system will provide a degree of protection against rain ingress. However, care should be taken to ensure that substrate walls are adequately weathertight prior to its application. The insulation system shall only be installed where there are no signs of dampness on the inner surface of the substrate other than those caused solely by condensation.

10.2 Designers and installers should take particular care in detailing around openings, penetrations and movement joints to minimise the risk of rain ingress. Only details approved by the Certificate holder should be used.

10.3 The guidance given in BRE Report BR 262 : 2002 should be followed in connection with the weathertightness of solid wall constructions. The designer should select a construction appropriate to the local wind-driven rain index, paying due regard to the design detailing, workmanship and materials to be used.

10.4 At the tops of walls, the system should be protected by an adequate overhang or other detail designed for use with this type of system.

11 Risk of condensation

11.1 Designers must ensure that an appropriate condensation risk analysis has been carried out for all parts of a construction, including at junctions, openings and penetrations, to minimise the risk of condensation. The recommendation of BS 5250 : 2011 should be followed.

Surface condensation

11.2 Walls will adequately limit the risk of surface condensation when the thermal transmittance (U value) does not exceed 0.7 $W \cdot m^{-2} \cdot K^{-1}$ at any point and the junctions with other elements and openings comply with section 6.3 of this Certificate.

11.3 Walls will adequately limit the risk of surface condensation when the thermal transmittance (U value) does not exceed 1.2 $W \cdot m^{-2} \cdot K^{-1}$ at any point. Guidance may be obtained from BS 5250 : 2011 (Section 8, Annex D) and BRE Report BR 262 : 2002.

Interstitial condensation

11.4 Walls incorporating the system will adequately limit the risk of interstitial condensation when they are designed and constructed in accordance with this Certificate.

11.5 The render used with the system has an equivalent air layer of thickness (S_d) of 0.24 m. This corresponds to a water vapour resistance factor (μ) of 13 for a render system of thickness of 19 mm.

11.6 The water vapour resistance factor (μ) for the grey EPS insulation boards is 60, as taken from BS EN ISO 10456 : 2007, Table 4.

12 Maintenance and repair

12.1 Regular checks should be made on the installed system, including:

- visual inspection of the render for signs of damage. Cracks in the render exceeding 0.2 mm must be repaired
- examination of the sealant around openings and service entry points
- visual inspection of architectural details designed to shed water to confirm that they are performing properly
- visual inspection to ensure that water is not leaking from external downpipes or gutters; such leakage could penetrate the rendering
- necessary repairs effected immediately and the sealant joints at window and door frames replaced at regular intervals
- maintenance schedules, which should include the replacement and resealing of joints, for example between the insulation system and window and door frame.

12.2 Damaged areas must be repaired using the appropriate components and the procedures detailed in the Certificate holder's installation instructions and in accordance with BS EN 13914-1 : 2005.

13 Durability

13.1 The system should remain effective for at least 30-years, provided any damage to the surface finish is repaired immediately, and regular maintenance is undertaken as described in section 12.

13.2 Any render containing Portland cement may be subject to lime bloom. The occurrence of this may be reduced by avoiding application in adverse weather conditions. The effect is transient and less noticeable on lighter colours.

13.3 The finishes may break up the flow of water on the surface and reduce the risk of discoloration by water runs. The finish may become discoloured with time, the rate depending on locality, initial colour, and degree of exposure and atmospheric pollution, as well as the design and detailing of the wall. In common with traditional renders, discoloration by algae and lichens may occur in wet areas. The appearance may be restored by a suitable power wash or, if required, by over coating.

13.4 To maintain a high quality aesthetic appearance, it may be necessary to periodically overcoat the building using system compatible coatings recommended by the Certificate holder and in accordance with BS EN 1062-1 : 2004. Care should be taken not to adversely affect the water vapour transmission or fire characteristics of the system. The advice of the Certificate holder should be sought as to the suitability of a particular product.

Installation

14 Site survey and preliminary work

14.1 A pre-installation survey of the property must be carried out to determine suitability for treatment and the need for any necessary repairs to the building structure before application of the Insul-Mace E External Wall Insulation System. A specification is prepared for the building indicating:

- the position of beads
- detailing around windows, doors and at eaves
- damp-proof course (dpc) level
- exact position of expansion joints
- areas where flexible sealants must be used
- any alterations to external plumbing
- the position of fire barriers, where required.

14.2 The survey should include tests conducted on the walls of the building by the Certificate holder or their approved installers (see section 15) to determine the pull-out resistance of the proposed mechanical fixings. An assessment and recommendation is made on the type and number of fixings required to withstand the building's expected wind loading based on calculations using the relevant wind speed data for the site and the pull-out resistances (see section 7).

14.3 Surfaces should be sound, clean and free from loose material. The flatness of surfaces must be checked; this may be achieved using a straight-edge spanning the storey height. Any excessive irregularities, ie greater than 10 mm in 1 metre, must be made good prior to installation to ensure that the insulation boards are installed with a smooth, in-plane finished surface.

14.4 On existing buildings, purpose-made window sills must be fitted to extend beyond the finished face of the system (see Figure 6). New buildings should incorporate suitably deep sills.

14.5 Where surfaces are covered with an existing rendering, it is essential that the bond between the background and the render is adequate. All loose areas should be hacked off and reinstated.

14.6 Internal wet work, eg screeding or plastering, should be completed and allowed to dry prior to the application of a system.

15 Approved installers

Application of the system, within the context of this Certificate, must be carried out by approved installers recommended or recognised by the Certificate holder. Such an installer is a company:

- employing operatives who have been trained and approved by the Certificate holder to install the system
- which has undertaken to comply with the Certificate holder's application procedure, containing the requirement for each application team to include at least one member operative trained by the Certificate holder
- subject to at least one inspection per annum by the Certificate holder to ensure suitable site practices are be employed. This may include unannounced site inspections.

16 Procedure

General

16.1 Application is carried out in accordance with the Certificate holder's current installation instructions.

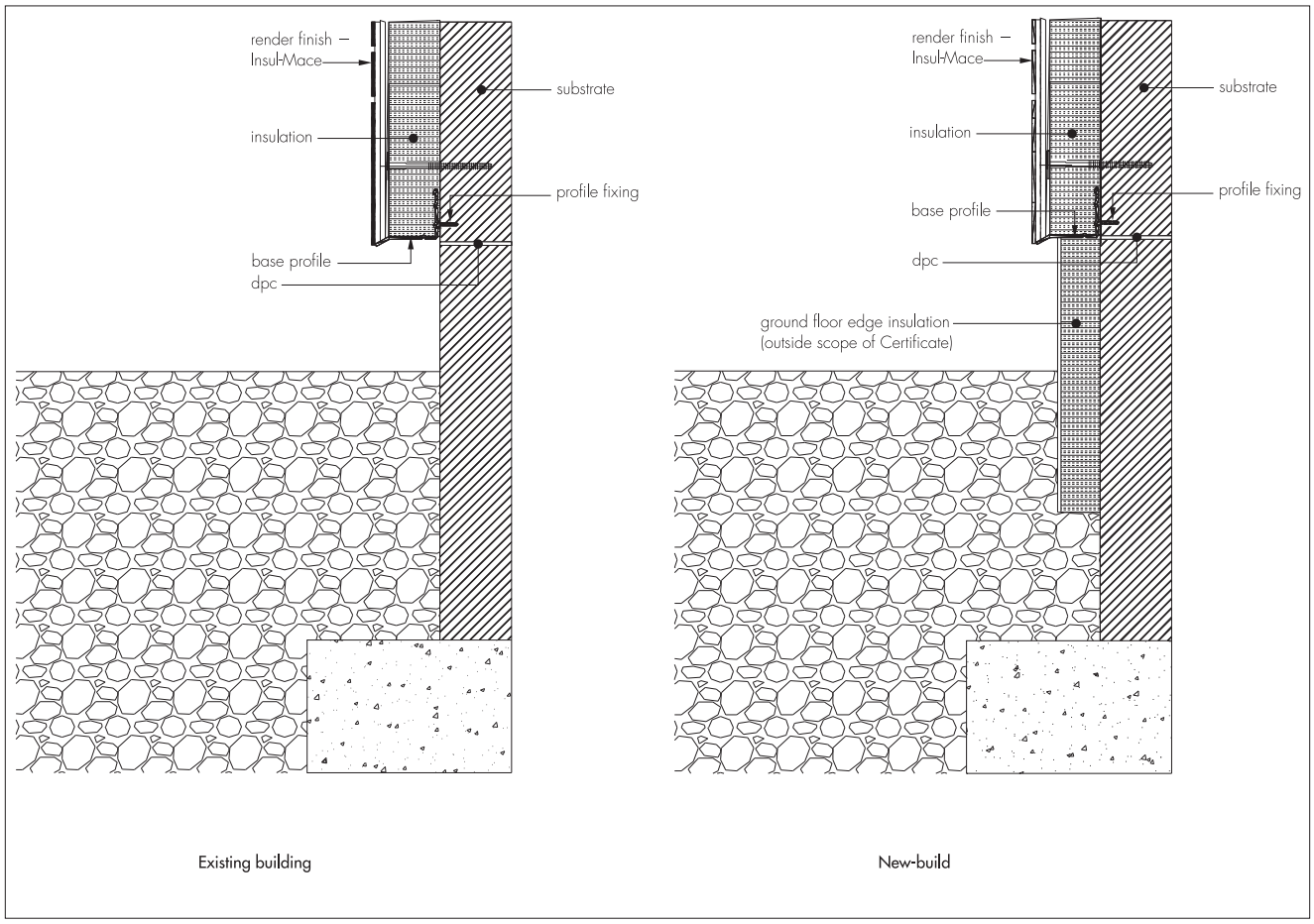
16.2 Weather conditions should be monitored to ensure correct application and curing conditions. Application of the coating material should not be applied at temperatures below 5°C or above 30°C, nor if exposure to frost is likely and the coating must be protected from rapid drying.

16.3 All rendering should be in accordance with the relevant recommendations of BS EN 13914-1 : 2005.

Positioning and securing insulation boards

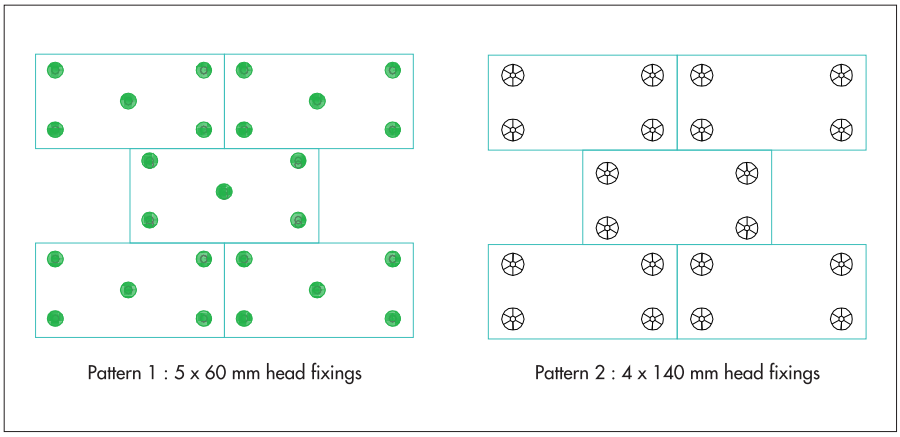
16.4 The base profile is secured to the external wall above the dpc using profile fixings at 300 mm maximum centres (see Figure 3). Beads and expansion joints are incorporated as specified.

Figure 3 Typical section at base level



16.5 The first run of insulation boards is positioned on the base profile. The insulation board is securely fixed to the substrate starting at the base trim level, using the project-specific fixing type and layout as shown in the project specification and drawings.

Figure 4 Typical fixing pattern

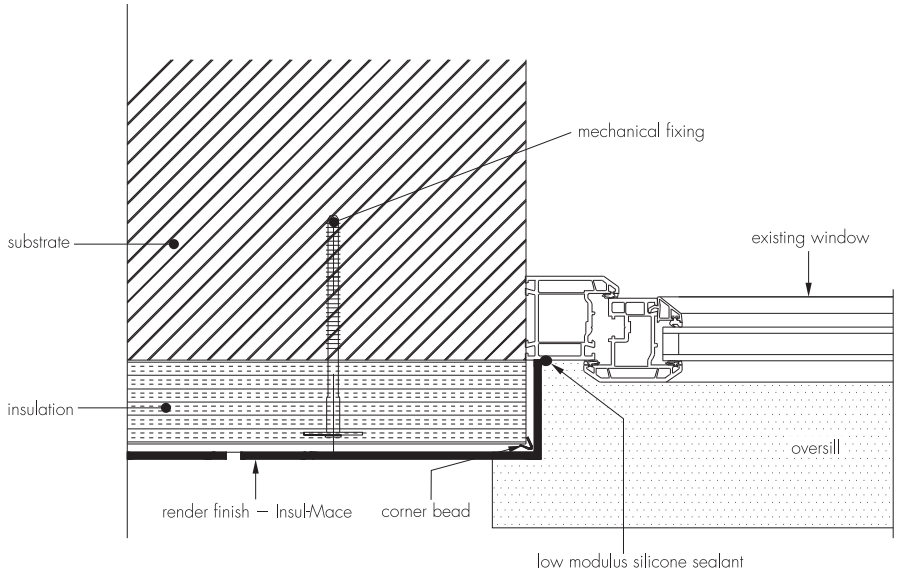


16.6 The boards are always laid in brick-bond fashion (see Figure 4). Care must be taken to ensure that the boards are fitted tight to each other. The boards are interlocked on the external corners. Gaps are filled with expanding PUR foam. The line and level are checked as work progresses.

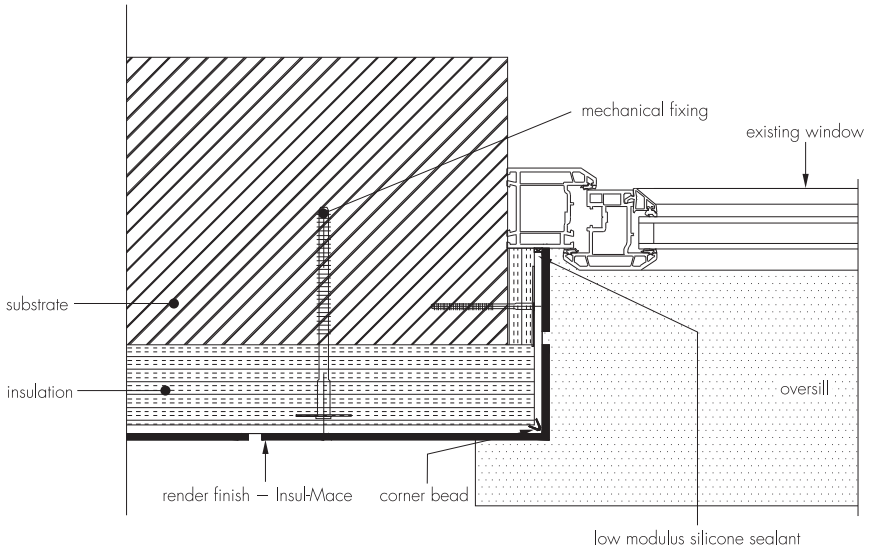
16.7 Holes are drilled into the substrate through the insulation to the required depth. Care must be taken to ensure that the depth of embedment of the fixing into the substrate is as specified, and allowance made where either existing render is on the wall or dubbing out render has been used to align the boards, as the effective embedment will be reduced. Depending on the project design requirements, mechanical fixings are inserted directly through the insulation or the reinforcing mesh (after basecoat has been applied) and the insulation, and tapped firmly into place, securing the insulation board to the substrate. The fixings are either hammered or screwed in depending on the type specified.

16.8 To fit around details such as doors and windows, insulation boards may be cut with a sharp knife or a fine-toothed saw. If required, purpose-made window sills are fitted at this stage. They are designed to prevent water ingress and incorporate drips to shed water clear of the system (see Figure 5).

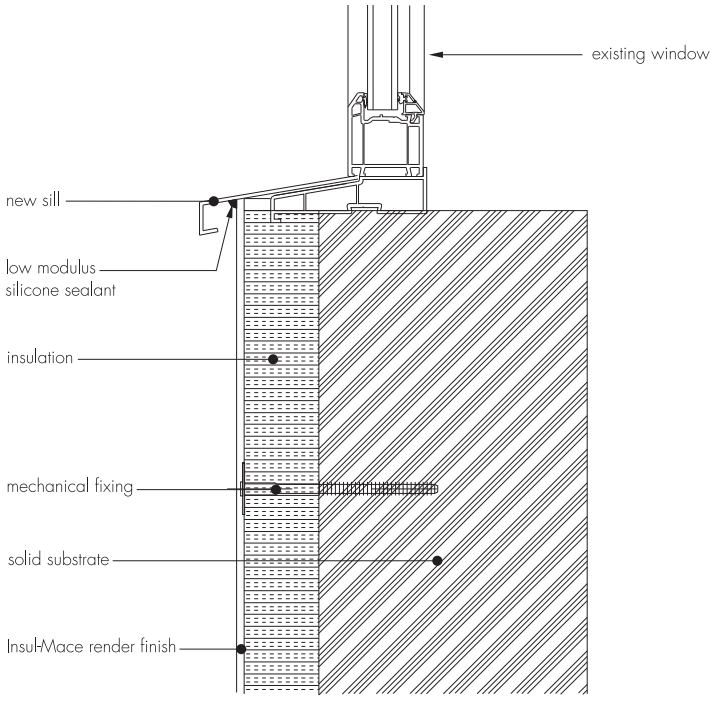
Figure 5 Details around openings



details of reveal (flush)



details of reveal (recessed)



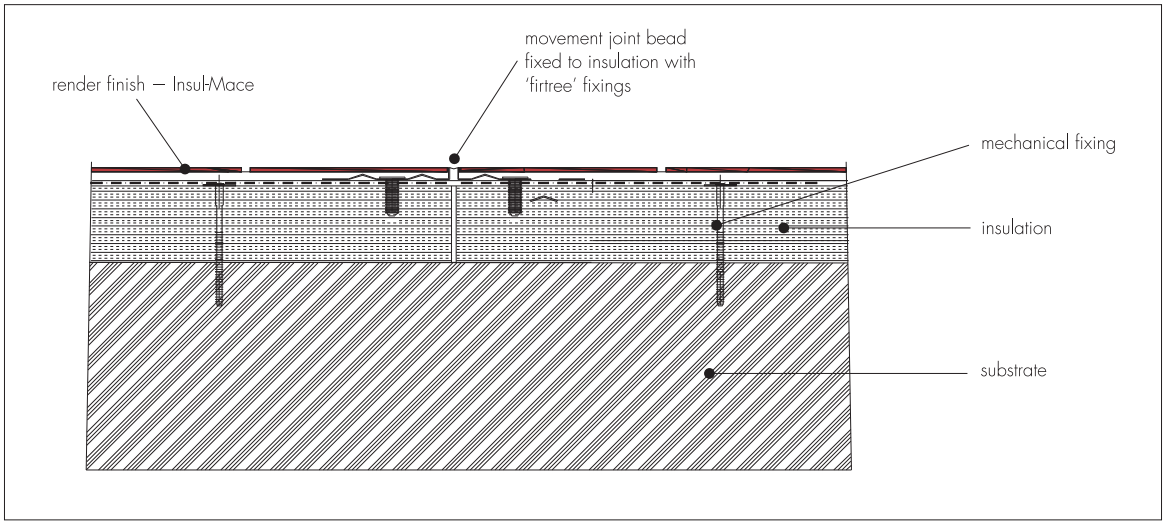
detail of sill

16.9 Installation continues until the whole wall is completely covered including, where appropriate, the building soffits. Only details specified and approved by the Certificate holder may be used.

Movement joints and render beads

16.10 Movement joints in the substrate must be continued through the system. This may necessitate the use of back-to-back full system stop beads with a mastic seal and backer strip, depending on the width of the joint and the degree of movement anticipated. Additional expansion joints in the insulation system are determined by the Certificate holder at the time of initial survey. The Certificate holder will take into account construction format, building design and fenestration when determining the regularity and positioning of both vertical and horizontal expansion joints in the system (see Figure 6).

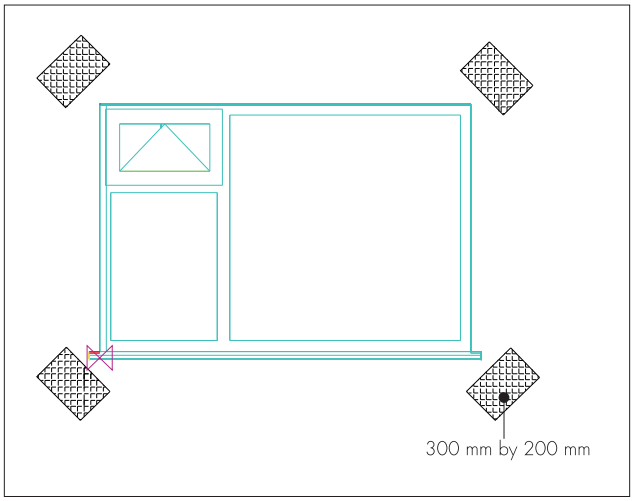
Figure 6 Expansion joint



16.11 The Insul-Poly 14 Basecoat should be mixed with 4 to 5 litres of potable water per 25 kg bag for a minimum of 5 minutes with an electric paddle mixer to disperse the additives. Corner beads with integral glassfibre wings should be fitted to all corners using the Insul-Poly 14 Basecoat. A thickness of 3 mm of the basecoat should be applied to the surface of the insulation using a stainless steel trowel or a render pump. The glassfibre mesh should be embedded in the wet render using the trowel and mechanical fixings applied, if required by the project specification. The sheets of mesh should be lapped by a minimum of 100 mm. Diagonal patches of mesh approximately 300 mm by 200 mm should also be installed at the corners of window/door openings (see Figure 7).

16.12 The second 3 mm thick coat of basecoat should be applied to give a total render thickness of 6 mm. The surface of the basecoat should be given a light diagonal scratch to provide a key for brick-effect render.

Figure 7 Additional reinforcement at openings



Render finish

16.13 The basecoat should be left to dry thoroughly before the application of Insul-Mace Render. Depending on the prevailing conditions, the render may take 3 to 4 days to dry completely.

16.14 Before applying the Insul-Mace Render, all windows, doors, gas meter boxes and any other feature/service penetration should be sealed with a low modulus silicone sealant.

16.15 The Insul-Mace Renders should be mixed with 4 to 5 litres of potable water per 25 kg bag for a minimum of 5 minutes with an electric paddle mixer to disperse the additives.

16.16 The first (mortar) layer should be applied to the surface of the basecoat using a hawk and trowel or projection render machine to a thickness of 6 mm to 8 mm and ruled off to a flat finish. Care should be taken not to over-trowel, polish the surface, or apply water during the setting time.

16.17 After the mortar layer has started to stiffen, the second layer (brick face) is applied to the mortar layer following its initial stiffening to an average thickness of 3 mm to 5 mm, using a hawk and trowel, or projection render machine. It must not be applied if the mortar layer has been allowed to dry and/or set.

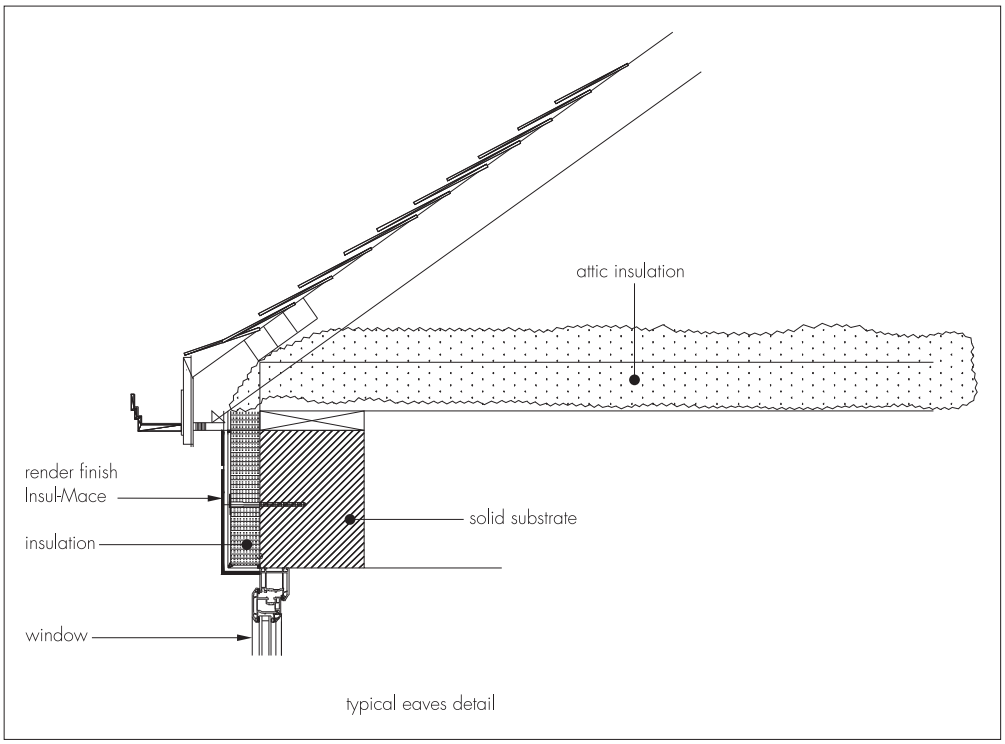
16.18 To achieve a textured surface finish, an appropriate tool — stiff brush, comb, sponge, spatula or other implement — can be used as required. Care should be taken not to over-trowel, polish the surface, or apply water during the setting time. The skill of the operator will determine the finish.

16.19 After the face layer has been shaded and textured, it should be cut out to the required pattern. The cutting should be delayed until the initial stiffening of the applied materials has occurred. The face layer is cut through completely and the mortar layer is cut into slightly, using an appropriate cutting tool. This reproduces recessed mortar coursing of the brickwork or stonework, as required. Spirit levels, templates and straight edges should be used for guiding this operation.

16.20 Following further stiffening of the materials, any face materials left by the cutting out should be removed using a soft bristled brush.

16.21 Care should be should be taken in the detailing of the system around features such as openings, projections and eaves (see Figure 8) to ensure adequate protection against water ingress and to limit the risk of water penetrating the system.

Figure 8 Eaves details



16.23 On completion, external fittings are re-fixed to the substrate using suitable fixing pads previously installed in the system.

Technical Investigations

17 Tests

An examination was made of data relating to:

- resistance to freeze/thaw
- heat/spray cycling
- impact resistance
- component characterisation
- water vapour permeability
- fire performance
- durability of finish coatings.

18 Investigations

18.1 The manufacturing process was evaluated, including the methods adopted for quality control, and details were obtained of the quality and composition of materials used.

18.2 An assessment of the risk of interstitial condensation was undertaken.

18.3 The practicability of installation and the effectiveness of detailing techniques were examined.

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19 Conditions

19.1 This Certificate:

- relates only to the product/system that is named and described on the front page
- is issued only to the company, firm, organisation or person named on the front page — no other company, firm, organisation or person may hold or claim that this Certificate has been issued to them
- is valid only within the UK
- has to be read, considered and used as a whole document — it may be misleading and will be incomplete to be selective
- is copyright of the BBA
- is subject to English Law.

19.2 Publications, documents, specifications, legislation, regulations, standards and the like referenced in this Certificate are those that were current and/or deemed relevant by the BBA at the date of issue or reissue of this Certificate.

19.3 This Certificate will remain valid for an unlimited period provided that the product/system and its manufacture and/or fabrication, including all related and relevant parts and processes thereof:

- are maintained at or above the levels which have been assessed and found to be satisfactory by the BBA
- continue to be checked as and when deemed appropriate by the BBA under arrangements that it will determine
- are reviewed by the BBA as and when it considers appropriate.

19.4 The BBA has used due skill, care and diligence in preparing this Certificate, but no warranty is provided.

19.5 In issuing this Certificate, the BBA is not responsible and is excluded from any liability to any company, firm, organisation or person, for any matters arising directly or indirectly from:

- the presence or absence of any patent, intellectual property or similar rights subsisting in the product/system or any other product/system
- the right of the Certificate holder to manufacture, supply, install, maintain or market the product/system
- actual installations of the product/system, including their nature, design, methods, performance, workmanship and maintenance
- any works and constructions in which the product/system is installed, including their nature, design, methods, performance, workmanship and maintenance
- any loss or damage, including personal injury, howsoever caused by the product/system, including its manufacture, supply, installation, use, maintenance and removal
- any claims by the manufacturer relating to CE marking.

19.6 Any information relating to the manufacture, supply, installation, use, maintenance and removal of this product/system which is contained or referred to in this Certificate is the minimum required to be met when the product/system is manufactured, supplied, installed, used, maintained and removed. It does not purport in any way to restate the requirements of the Health and Safety at Work etc. Act 1974, or of any other statutory, common law or other duty which may exist at the date of issue or reissue of this Certificate; nor is conformity with such information to be taken as satisfying the requirements of the 1974 Act or of any statutory, common law or other duty of care.

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